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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/559,098	01/10/2007	Mario Leclerc	GENOM.071NP	1280

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KNOBBE MARTENS OLSON & BEAR LLP
2040 MAIN STREET
FOURTEENTH FLOOR
IRVINE, CA 92614

EXAMINER	
PITRAK, JENNIFER S	

ART UNIT	PAPER NUMBER
1635	

NOTIFICATION DATE	DELIVERY MODE
11/12/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

jcartee@kmob.com
eOAPilot@kmob.com

Office Action Summary	Application No.	Applicant(s)	
	10/559,098	LECLERC ET AL.	
	Examiner	Art Unit	
	JENNIFER PITRAK	1635	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 September 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,4-26 and 35-38* is/are pending in the application.

4a) Of the above claim(s) *5,6,9-26 and 35-38* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,4,7,8* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 09/18/2009 has been entered.

Remarks

Claims 1, 4-26, and 35-38 are pending. Claims 5, 6, 9-26, and 35-38 are withdrawn from consideration as being directed to non-elected subject matter. Claims 1, 4, 7, and 8 are under examination.

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Priority

Claims 7 and 8 are provided the benefit of the filing date of PCT/CA04/00824, which is 06/03/2004, for the reasons of record. Claims 1 and 4 are provided the benefit of the filing date of the provisional application 60/474,950, which is 06/03/2003, for the reasons of record.

Claim Rejections - 35 USC § 103 - Maintained

Claims 1 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ho, *et al.* (2002, item 16 on 12/01/2005 IDS) and Gold (1996, JBC, v.270:13581-4, of record). This rejection is maintained for the reasons of record.

Response to arguments

Applicant argues that the underlying principle behind the usefulness of the polythiophene derivatives as reagents to detect hybridization events as taught by Ho, et al. is that the electrostatic interactions and conformational structures formed when polythiophene derivatives are in contact with single-stranded oligonucleotides differ from those formed when the polythiophene derivatives are in contact with double-stranded nucleic acids. Applicant asserts that one of ordinary skill would have had no reasonable expectation that an aptamer attached to the recited polythiophene would undergo similar electrostatic and/or conformational changes when bound by a ligand, such that colorimetric or fluorometric output is changed. This is not persuasive. The teachings of Ho show the recited polythiophene derivative was extremely sensitive to changes in the ligand that bound to the oligonucleotide probe. For example, Ho taught that the sensor could distinguish between a fully complementary oligonucleotide duplex, an oligonucleotide duplex with a single mismatch, and an oligonucleotide duplex with two mismatches (Fig. 4 on page 1551 and paragraph bridging pages 1549 and 1550). These data support the assertion of Nilsson, et al. (of record) that conjugated polythiophenes are very sensitive to minor perturbations, providing evidence that this assertion holds true in the specific case of the instantly recited polythiophene. Complementary binding interactions, such as those undertaken by aptamers, generally require electrostatic interactions in addition to hydrophobic and van der Waals interactions. Because of this, one of ordinary skill would reasonably expect

binding of an aptamer to its ligand to have an effect on the electrostatic interaction of the aptamer with the polythiophene. In view of the sensitivity demonstrated by Ho, et al., one of ordinary skill would have had a reasonable expectation of obtaining a detectable response upon aptamer binding a ligand.

Applicant further argues that the instant claims are drawn to optical sensors for the detection of potassium ions, small organic molecules, amino acids, proteins, whole cells, and nucleotides, none of which form dsDNA in the presence of a ssDNA aptamer and therefore would not form a polythiophene/hybridized nucleic acid triplex as taught by Ho, et al. (page 7 of 09/18/2009 response). Applicant also argues that the claimed target "nucleotides" are monomers, not part of a polymer (oligonucleotide) as interpreted by the Examiner (page 8 of 09/18/2009 response). These arguments are not persuasive for the reasons set forth above, i.e. in view of the teachings of Ho regarding the sensitivity of the recited polythiophenes to their electrostatic environment, one of ordinary skill would have had a reasonable expectation of obtaining a detectable response upon binding of a ligand to an aptamer. Furthermore, the claims are directed to optical sensors comprising an "aptamer" to a nucleotide "target". According to the specification, an "aptamer" is a single-stranded oligonucleotide that binds to a specific molecular target (page 7, paragraph 28) and a "target" is a charged entity (page 8, paragraph 32). Although nucleotides may be monomeric, the claim as drafted does not preclude that the target nucleotides are part of a polymer (oligonucleotide). The "aptamer", or single-stranded oligonucleotide, of the claims may act as a probe. One of skill in the art would clearly expect that such an aptamer in combination with polythiophene would act as an optical sensor for nucleotides because Ho, et al. clearly teach such an optical sensor.

Applicant argues that the Gold reference is silent with regard to polythiophene derivatives and therefore the reference does not provide any reason to expect that polythiophenes can be used in any way. This is not persuasive because Gold teaches aptamers as useful for detecting analytes and that aptamers can be modified with visualization-enhancing adducts and reporters. Therefore, the skilled artisan would recognize the polythiophene derivative of Ho, et al. as a visualization-enhancing adduct for use with aptamers, particularly in view of the sensitivity of the polythiophene derivative as taught by Ho, et al.

Applicant finally argues that the withdrawal of the rejection of claims 7 and 8 under 35 USC § 103(a) over Ho, et al., Gold, and Michaud, et al. appears to indicate that the Examiner agrees that claims 1 and 4 are patentable over Ho and Gold. This is not persuasive because, as written, claims 1 and 4 encompass an optical sensor comprising a single-stranded DNA probe ("aptamer") and an oligonucleotide (comprising nucleotides). Also, the rejection of claims 7 and 8 under 35 USC § 103(a) over the Michaud, Ho, Gold, McQuade, and Nilsson references, supersedes that over Ho, Gold, and Michaud, providing reasons to use polythiophenes and aptamers for detecting biological analytes.

Claim Rejections - 35 USC § 103 - Maintained

Claims 1, 4, 7, and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Michaud, *et al.* (02/15/2004, Analytical Chemistry, V.74:1015-20, of record), Ho, *et al.* (2002, item 16 on 12/01/2005 IDS), McQuade, *et al.* (2000, item 22 on 02/18/2009 IDS), Gold (1996, JBC, v.270:13581-4, of record), and Nilsson, et al. (2002, item 24 on 02/18/2009 IDS). This rejection is maintained for the reasons of record.

Response to arguments

Applicant argues that there is nothing in the Ho reference to lead one of skill in the art to reasonably expect that an "aptamer-target" could be substituted for the "oligonucleotide/ssDNA target" described in the reference (pages 9-10 of 09/18/2009 response). This is not persuasive. The Ho reference teaches the extreme sensitivity of the polythiophene compound such that the skilled artisan would reasonably expect the binding of an aptamer to its target to elicit a detectable signal, as argued in the preceding response to arguments.

Applicant argues that the McQuade reference is completely silent with regard to the specific polythiophene derivatives of the instant claims and that the reference does not teach an "optical sensor" use of the polythiophene shown in Figure 24 of the reference because capacitance current is measured, as opposed to an optical signal (page 10, second paragraph of 09/18/2009 response). This is not persuasive. McQuade, et al. teach that polythiophenes can be used to detect analytes, albeit via electrical signals, with antibodies, which are functional equivalents of aptamers. McQuade, et al.'s teaching of the use of polythiophenes for transmitting capacitance current as a means to detect antibody-analyte binding emphasizes the versatility of polythiophenes. The lack of structural correlation between McQuade, et al.'s compound and the instantly claimed polythiophene is not important in view of the teachings of Ho, et al., who teach the specific polythiophene derivative of the instant claims as an optical sensor.

Applicant also argues that because the McQuade reference is silent about the use of an optical sensor that includes an oligonucleotide that binds to an aptamer, there is therefore no scientific basis that would lead the skilled artisan to assume that an antigen/antibody interaction could and would provide the same type of environment as an oligonucleotide/aptamer interaction or that the association between the polythiophene derivative and a protein and the polythiophene derivative and an oligonucleotide would be similar. This is not persuasive. First, the teachings

of McQuade to which Applicant refers emphasizes the versatility of polythiophenes in detecting analytes and bolsters the case that one of skill in the art would reasonably expect that the use of polythiophenes for detecting analytes with aptamers would be successful. Also, the Ho reference alone indicates that an "aptamer" as instantly claimed in claims 1 and 4 binding to an oligonucleotide would readily produce a detectable signal.

Applicant finally argues that the Nilsson reference is silent with regard to the precise polythiophene instantly claimed and that the reference provides no teaching to lead one of skill in the art to the instantly claimed optical sensors. This is not persuasive. Nilsson, et al. teaches that conjugated polythiophenes are very sensitive to minor perturbations, providing additional motivation and an expectation of success for using polythiophenes to detect aptamer-analyte interactions. With regard to Applicant's argument that Nilsson, et al. do not teach the instantly claimed polythiophene, this is not important because Ho, et al. teach the specific polythiophene of the instant claims.

Conclusion

All claims are drawn to the same invention claimed in the application prior to the entry of the submission under 37 CFR 1.114 and could have been finally rejected on the grounds and art of record in the next Office action if they had been entered in the application prior to entry under 37 CFR 1.114. Accordingly, **THIS ACTION IS MADE FINAL** even though it is a first action after the filing of a request for continued examination and the submission under 37 CFR 1.114. See MPEP § 706.07(b). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Jennifer Pitrak
Examiner
Art Unit 1635

/Richard Schnizer/
Primary Examiner, Art Unit 1635